CHAPTER 4

1 Adding and Subtracting Using Mental Math

Goal **Use mental math strategies to add and subtract.**

1. Use mental math to calculate each answer. Explain your strategy.

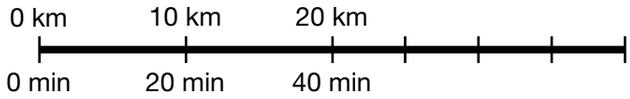
a) 54 + 29 Round both numbers to nearest 5 before adding. Then adjust sum to get exact answer. 55 + 30 = 85, 85 – 2 = 83

b) 88 + 32 Regroup numbers, then add. (88 + 2) + 30 = 120

c) 100 − 48 Round second number to nearest 10 before subtracting. Then adjust difference to get exact answer. 100 – 50 = 50, 50 + 2 = 52

d) 70 − 14 Regroup numbers, then subtract. (70 – 10) – 4 = 56

2. The Boston Marathon is a 42 km run. Aaron ran the marathon in 100 min.



Use mental math to calculate Aaron's distance and time at each point during the 42 km run. Describe your strategy.

Distance	0 km	10 km	20 km	25 km	30 km	35 km	40 km
Time	0 min	20 min	40 min	55 min	70 min	85 min	100 min

Aaron took 20 min to run 10 km during the first half of the run. Since there were 4 more points during the run, each point was about an extra 5 km. Aaron was tiring so his pace slowed down. He was taking about 30 min to run 10 km (15 min at each of the remaining points).

At-Home Help

Rounding is a mental math strategy for adding and subtracting numbers. When you round, you will likely need to adjust your answer to get the exact answer.

For example:

23 + 58 can be rounded to 20 + 60 = 80. 23 is 3 more than 20 and 58 is 2 less than 60. So adjust answer by adding 1. Answer is 81.

76 − 40 can be rounded to 80 − 40 = 40. 76 is 4 less than 80. So adjust answer by subtracting 4. Answer is 36.

Regrouping is another mental math strategy for adding and subtracting numbers. Regroup numbers into 5s or 10s to make calculations easier.

For example:

43 + 92 can be regrouped as (43 + 2) + 90. Answer is 45 + 90 = 135.

80−19 can be regrouped as (80 −10) − 9. Answer is 70 − 9 = 61.

CHAPTER 4

2 Estimating Sums and Differences

Goal **Estimate sums and differences and justify your strategy.**

1. Estimate which calculations are reasonable. Explain how you estimated.

a) $2997 + 1158 = 4155$

Reasonable because 3000 + 1100 = 4100, which is close to 4155.

b) $6053 - 4802 = 2251$

Not reasonable because 6000 – 4800 = 1200, which is less than 2251.

c) $8095 - 2559 = 5536$

Reasonable because 8100 – 2500 = 5600, which is close to 5536.

d) $3273 + 897 + 4298 = 8238$

Not reasonable because 3300 + 900 + 4300 = 8500, which is greater than 8238.

At-Home Help

To check the reasonableness of a calculation, estimate the answer using one or more mental math strategies.

For example:

To check if $1198 + 1510 + 1454 + 1354 = 8516$ is reasonable, use rounding and regrouping. Then estimate the sum.

$1200 + 1500 + 1400 + (50 + 1350)$
$= 1200 + 1500 + 1400 + 1400$
$= 5500$

So the sum 8516 is not reasonable.

2. The chart shows data for hockey players in a town.

Hockey players		Number of players
Boys	novice level	4854
	atom level	5013
Girls	novice level	3955
	atom level	2081

How many more hockey players are boys than girls? Estimate to check the reasonableness of your calculation. Show your work and justify your choice of estimation strategies.

Estimate		Actual answer	
Boys	4900 + 5000 = 9900	Boys	4854 + 5013 = 9867
Girls	4000 + 2100 = 6100	Girls	3955 + 2081 = 6036
Difference	9900 – 6100 = 3800	Difference	9867 – 6036 = 3831

I rounded the number of players to the nearest hundred before adding. My answer of 3800 was very close to the actual answer of 3831.

CHAPTER 4

3 Adding Whole Numbers

Goal **Add 3 four-digit whole numbers using paper and pencil.**

1. Estimate and then add. Show your work.

a)
2549
3288
+ 7426

2500
3300
+ 7400
13 200

13 263

b)
5283
6094
+ 846

5300
6100
+ 800
12 200

12 223

c)
7106
5882
+ 4037

7100
5900
+ 4000
17 000

17 025

At-Home Help

When adding several whole numbers together, you can estimate the sum using rounding.

For example:

		Estimate
	1899	1900
	3045	3000
	+ 2357	+ 2400
Actual answer →	7301	7300

d) 1093 + 2764 + 898

1100
2800
+ 900
4800

4755

e) 7549 + 3808 + 4261

7500
3800
+ 4300
15 600

15 618

2. Seven students wrote stories, each with a different number of words. What 3 stories have a total between 7000 and 8000 words? Show your work.

Student	Number of words
Raj	2419
Sima	3256
Ben	3780
Cathy	2934
Bill	4087
Dan	2593
Kew	1806

Student	Estimated number of words
Raj	2400
Sima	3300
Ben	3800
Cathy	2900
Bill	4100
Dan	2600
Kew	1800

Possible combinations: Raj, Sima, Kew (7481 words)
Raj, Cathy, Dan (7946 words)
Raj, Cathy, Kew (7159 words)
Sima, Cathy, Kew (7996 words)
Sima, Dan, Kew (7655 words)
Cathy, Dan, Kew (7333 words)

CHAPTER 4

4 Solve Two-Step Problems

Goal **Select operations and solve two-step problems.**

1. Rachel shot baskets each day for a period of 2 weeks. She shot a total of 2260 baskets. Rachel shot 100 more baskets each day during the last 3 days. How many shots per day did she take during the first week?

total number of baskets shot not including extras:
2260 – 300 = 1960 baskets

number of baskets shot per day during first week:
1960 ÷ 14 = 140 baskets

At-Home Help

When solving word problems, follow these steps.

- First write down what you are asked to find out.
- Then look at the information you are given.
- Decide what information is important.
- Make a plan.
- Choose operations that use the given information to solve the problem.
- Check if your answer is reasonable.

Remember to show all your work.

2. Mr. James is 49 years of age. His sister is 45 years of age. What is the difference in age in each of these units of time? Show your work.

a) months

49 – 45 = 4 years
4 x 12 = 48 months

b) weeks

49 – 45 = 4 years
4 x 52 = 208 weeks

c) days

49 – 45 = 4 years
4 x 365 = 1460 days

3. A school has a total of 1258 students. There are 297 primary students and 364 junior students. How many senior students are there?

297 + 364 = 661 primary and junior students
1258 – 661 = 597 senior students

CHAPTER 4

5 Communicate About a Choice of Calculation Method

Goal **Justify your choice of calculation method and explain each step in solving a problem.**

1. Marcus was at Youth Camp. He had a total of 3025 points that he could spend at the camp store. About how many points does he have left?

Camp store item	Cost in points
Candy	875
Ice cream	436
Chips	297
Drinks	980

Alana wrote this rough copy to solve the problem.

I only need to estimate, because the problem asks "about" how many points are left.
Marcus spent about 2600 points.
He had about 3000 points in total.
He should have about 400 points left.

At-Home Help

When writing a solution to a word problem, first write a rough copy.
- If the problem does not ask for an exact answer, use estimation to find the answer.
- You can use rounding, regrouping, or any other mental math strategy.
- Check if your answer is reasonable.

Then write a good copy explaining all your steps.

Remember to show all your work.

Communication Checklist
☑ Did you explain your thinking?
☑ Did you show all the steps?
☑ Did you use math language?

Write a good copy. Use the Communication Checklist to help you.

I used mental math to round the numbers in the chart.
I then added the rounded numbers together to find out how much Marcus spent.
900 + 400 + 300 + 1000 = 2600 points
I rounded the total number of points to 3000.
I subtracted how much Marcus spent from his total points.
3000 – 2600 = 400
Marcus has about 400 points.

2. Richard and his friends collected a total of 4548 old coins. The chart shows some of the coins.

Type of coin	Number of coins
Penny	789
Nickel	1516
Dime	934

a) Richard forgot to list quarters in the chart. About how many quarters were collected?

1300 quarters

b) About how many more pennies would be needed to match the number of nickels?

700 more pennies

CHAPTER 4

6 Adding Decimals

Goal **Add decimal tenths and hundredths using base ten blocks and pencil and paper.**

1. Estimate and then add. Show your work.

a)
$$\begin{array}{r} 8.3 \\ +\ 5.7 \\ \hline \end{array}$$

8
+ 6
14

14.0

b)
$$\begin{array}{r} 6.89 \\ +\ 5.43 \\ \hline \end{array}$$

7
+ 5
12

12.32

c) 5.16 + 3.87

5
+ 4
9

9.03

d) 4.93 + 0.82 + 6.95

5
1
+ 7
13

12.70

2. Estimate and then calculate the total distance. Show your work.

0.85 km and 5.28 km

Estimate	Actual answer
1 km	0.85 km
+ 5 km	+ 5.28 km
6 km	6.13 km

3. Dmitri added 2.78 and 5.49. He also added 278 and 549. He compared his answers.

a) Explain how the answers are the same.

The numbers being added in each case have identical digits. Also, both sums have identical digits.

b) Explain how the answers are different.

The position of the decimal point is not the same in both addition questions. This means that although the digits are identical, their corresponding place values are not.

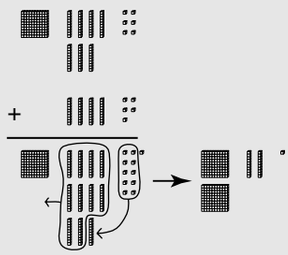
At-Home Help

Decimal tenths and hundredths are added using the same rules as whole numbers.

- It is easier to add vertically if the decimal points are aligned.
- Add place values that are the same starting from the smallest place value.
- If the sum of a place value is 10 or more, regroup using the next greater place value.
- Check your answer using estimation.

For example:

		Estimate
	1.76	2
	+ 0.45	+ 0
Actual answer →	2.21	2



CHAPTER 4

7 Adding Money

Goal **Use various methods to calculate the cost of purchases.**

1. Estimate and then add. Show your work.

a)
$23.65
19.88
+ 14.63

$24
20
+ 15
$59

$58.16

b)
$18.63
+ 12.88

$19
+ 13
$32

$31.51

c)
$52.64
0.86
+ 8.29

$53
1
+ 8
$62

$61.79

At-Home Help

Adding money amounts is the same as adding decimal hundredths.

Use estimation to check your sums.

For example:

		Estimate
	$29.95	$30
	+ 35.95	+ 36
Actual answer →	$65.90	$66

d) $2.65 + $1.74

$3
+ 2
$5

$4.39

e) $13.43 + $7.09

$13
+ 7
$20

$20.52

f) $48.91 + $0.72

$49
+ 1
$50

$49.63

2. a) Create a problem involving buying 2 or more video games. Solve your problem. Show your estimate and actual answer.

Suggested answer: Mohammed bought birthday presents for his 2 brothers. He bought 1 Race Car Rally and 2 Wave Surfer games. How much did Mohammed spend on all the games?

Mohammed spent $30.43.

Name of video game	Cost
Hockey Super Stars	$26.50
World Cup Soccer	$23.78
Race Car Rally	$10.45
Wave Surfer	$9.99

Estimate
$10
+ 2(10)
$30

Actual answer
$10.45
+ 2(9.99)
$30.43

b) Explain how you calculated your answer. Then check your answer.

Since Mohammed bought 2 games that are the same, I can multiply the cost of the game by 2.
Wave Surfer: 2 x $9.99 = $19.98
Then I find the sum. $10.45 + $19.98 = $30.43
Mohammed spent $30.43.

To check my answer, I round the cost of the video games and then estimate the sum.
Wave Surfer: 2 x $10 = $20
Total: $10 + $20 = $30
Mohammed spent about $30.

CHAPTER 4

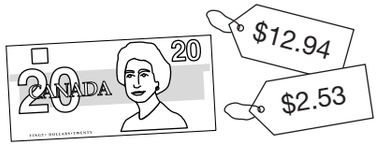
8

Making Change

Goal **Calculate change from purchases.**

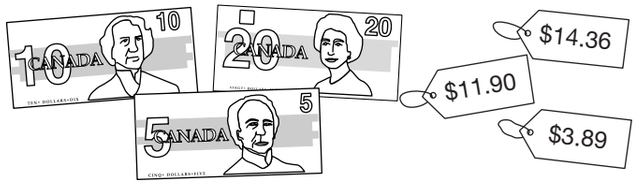
1. Calculate the total cost and the amount of change.

a)



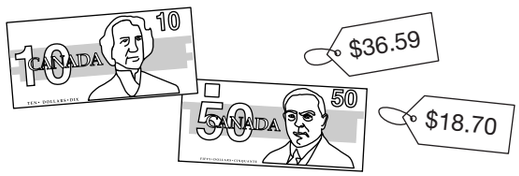
(cost) $15.47, (change) $4.53

b)



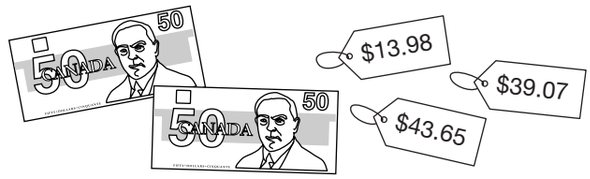
(cost) $30.15, (change) $4.85

c)



(cost) $55.29, (change) $4.71

d)



(cost) $96.70, (change) $3.30

At-Home Help

To calculate change from purchases, first find the total cost.

You can use estimation if you want to find the approximate cost.

Then subtract the total cost from the total amount of money you have.

2. You have been given $60 for your birthday.

Item	Cost
Shirt	$25.85
Binder	$15.99
Sunglasses	$9.43
Video game	$17.68
Book	$23.97
Music CD	$34.25

a) Choose 2 items you can buy. Calculate the total cost. Then choose 3 items and calculate the total cost. Show your work.

Suggested answers:

Items	Cost
shirt and binder	$25.85 + $15.99 = $41.84
binder, sunglasses, and video game	$15.99 + $9.43 + $17.68 = $43.10

b) How much change will you receive? Show your work.

(using suggested answers given)

Items	Change
shirt and binder	$60.00 – $41.84 = $18.16
binder, sunglasses, and video game	$60.00 – $43.10 = $16.90

CHAPTER 4

9 Subtracting Decimals

Goal **Use base ten blocks and pencil and paper to subtract decimal tenths and hundredths.**

1. Estimate and then subtract. Show your work.

a) 9.85 − 7.14

10 − 7 = 3

2.71

b) 6.03 − 1.57

6 − 2 = 4

4.46

c) 7.00 − 4.96

7 − 5 = 2

2.04

d) 8.67 − 5.82

9 − 6 = 3

2.85

e) 7.6 − 3.8

8 − 4 = 4

3.8

f) 9.00 − 5.16

9 − 5 = 4

3.84

g) 25.34 − 5.79

25 − 6 = 19

19.55

2. In long jump, Benjamin jumped 4.85 m while his friend Dan jumped 5.62 m. How much farther did Dan jump than Benjamin?

0.77 m

3. Sofia got an answer of 3.75 when she subtracted 5.25 from a whole number. What is the whole number? Explain how you got your answer.

Add 3.75 and 5.25 to find the whole number, which is 9.

To recheck answer, subtract: 9.00 − 5.25 = 3.75

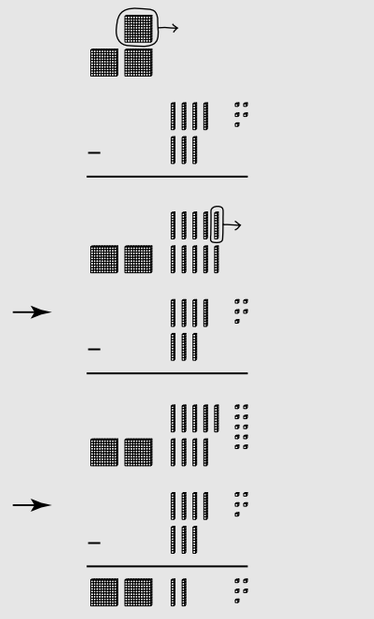
At-Home Help

Decimal tenths and hundredths are subtracted using the same rules as whole numbers.

- It is easier to subtract vertically if the decimal points are aligned.
- Subtract place values that are the same starting from the smallest place value.
- If you can't find the difference for a particular place value, regroup using the next greater place value.
- Check your answer using estimation.

For example:

		Estimate
	3.00	3
	− 0.75	− 1
Actual answer →	2.25	2



CHAPTER 4

Test Yourself

Circle the correct answer.

1. Which question would give an answer close to 2591?

A. 3658 − 1149 **B.** 1468 + 1897 **C.** 1255 + 1349 **D.** 4513 − 2928

2. Using estimation, which question has an answer between 1350 and 1450?

A. 1046 + 829 **B.** 6391 − 4869 **C.** 874 + 573 **D.** 2836 − 1264

3. Which calculation is most reasonable?

A. 1259 + 745 + 5567 = 7754 **B.** 1259 + 745 + 5567 = 6747

C. 1259 + 745 + 5567 = 6574 **D.** 1259 + 745 + 5567 = 7574

4. Three transport trucks can move loads that total 4581 kg. Two of the trucks moved 2614 kg and 1088 kg. How much would you estimate the third truck moved?

A. 780 kg **B.** 700 kg **C.** 900 kg **D.** 800 kg

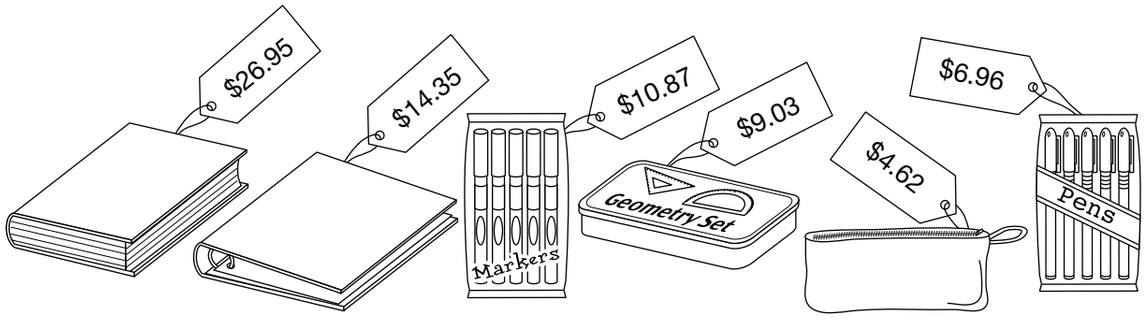
5. What is the answer to 7246 − 3859?

A. 4613 **B.** 3387 **C.** 4631 **D.** 3287

6. Sima is 3655 days old. Mario's cousin is 298 days older than Sima. Mario is 189 days younger than his cousin. How many days old is Mario?

A. 3764 days **B.** 3953 days **C.** 3466 days **D.** 3769 days

7. What is the total cost shown?



A. $72.87 **B.** $67.78 **C.** $72.78 **D.** $67.87

8. Tina gave the store clerk a $100 bill for all the items in Question 7. How much change would she receive?

A. $32.78 **B.** $27.78 **C.** $32.22 **D.** $27.22